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10/525,122	03/20/2006	Sang-In Lee	067538-5171US	2947

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EXAMINER	
ROMAN, ANGEL	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/525,122	LEE ET AL.	
	Examiner	Art Unit	
	ANGEL ROMAN	2812	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 January 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6 and 8-25* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6 and 8-25* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 February 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *12/01/08*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Claims 1-9, 12-16 and 19-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baum et al. U.S. Patent 6,869,638 B2 filed 09/18/2001.

Regarding claim 1, Baum et al. discloses a method of growing a metal silicate film on a substrate to form a gate dielectric film (see Abstract) or capacitor (see column 1, lines 15-47) by atomic layer deposition (see column 14, lines 38-40) comprising: (i) introducing a metal organic precursor comprised of the formula M(NRsub1Rsub2)4 (see Abstract with a metal oxidation state of x=4) and a silicon organic precursor comprised of a silicon alkyl amide of the formula Si(NRsub1Rsub2)4 (see Abstract with x and y = 0 in the aminosilane compound) into a reaction chamber containing a substrate (see column 14, lines 47-48); (ii) purging the reaction chamber; (iii) introducing and oxidizing gas including ozone into the reaction chamber (see column 15, lines 54-57); (iv) purging the reaction chamber; (v) repeating steps (i), (ii), (iii) and (iv) until a film of a target thickness is achieved on the substrate (see column 14, lines 38-50); placing a conductive film over the dielectric film (see figure 1); wherein the temperature of the wafer is maintained between from about 250 to about 750 degrees Celsius (see column

15, lines 58-61). Baum et al. discloses the claimed invention except for process examples teaching a process temperature below 300 degrees Celsius. It would have been obvious to one having ordinary skill in the art at the time the invention was made to perform a process using a process temperature below 300 degrees Celsius, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Regarding claim 2, Baum et al. discloses the substrate being silicon (see column 2, lines 30-35).

Regarding claim 3, Baum et al. discloses the metal in the metal organic precursor being a Group 4 metal (see column 15, line 62).

Regarding claim 4, Baum et al. discloses the metal in the metal organic precursor being hafnium (see column 15, line 62).

Regarding claim 5, Baum et al. discloses the metal organic precursor being a linear, branched and cyclic alkyl (see Abstract).

Regarding claim 6, Baum et al. discloses the metal organic precursor being a metal alkyl amide (see Abstract).

Regarding claim 7, Baum et al. discloses the silicon organic precursor being a silicon alkyl amide (see Abstract).

Regarding claim 8, Baum et al. discloses the metal organic precursor being a metal alkoxide (see column 18, lines 20-31).

Regarding claim 9, Baum et al. discloses the metal organic precursor and the silicon organic precursor being mixed, volatilized, and introduced into the chamber as a mixed gas (see column 15, lines 62-65).

Regarding claim 12, Baum et al. discloses a method of growing a metal silicate film on a substrate to form a gate dielectric film (see Abstract) or capacitor (see column 1, lines 15-47) by atomic layer deposition (see column 14, lines 38-40) comprising: (i) introducing a metal organic precursor comprised of the formula M(NRsub1Rsub2)4 (see Abstract with a metal oxidation state of x=4) and a silicon organic precursor comprised of a silicon alkyl amide of the formula Si(NRsub1Rsub2)4 (see Abstract with x and y = 0 in the aminosilane compound) into a reaction chamber containing a substrate (see column 14, lines 47-48); (ii) purging the reaction chamber; (iii) introducing and oxidizing gas including ozone into the reaction chamber (see column 15, lines 54-57); (iv) purging the reaction chamber; (v) repeating steps (i), (ii), (iii) and (iv) until a film of a target thickness is achieved on the substrate (see column 14, lines 38-50); placing a

conductive film over the dielectric film (see figure 1); wherein the temperature of the wafer is maintained between from about 250 to about 750 degrees Celsius (see column 15, lines 58-61). Baum et al. discloses the claimed invention except for process examples teaching a process temperature below 300 degrees Celsius. It would have been obvious to one having ordinary skill in the art at the time the invention was made to perform a process using a process temperature below 300 degrees Celsius, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Regarding claim 13, Baum et al. discloses the substrate being silicon (see column 2, lines 30-35).

Regarding claim 14, Baum et al. discloses the metal in the metal organic precursor being a Group 4 metal (see column 15, line 62).

Regarding claim 15, Baum et al. discloses the silicon organic precursor being a silicon alkyl amide (see Abstract).

Regarding claim 16, Baum et al. discloses the metal organic precursor and the silicon organic precursor being mixed, volatilized, and introduced into the chamber as a mixed gas (see column 15, lines 62-65).

Regarding claim 19, Baum et al. discloses a method of growing a metal silicate film on a substrate to form a capacitor (see column 1, lines 15-47) by atomic layer deposition (see column 14, lines 38-40) comprising: (i) introducing a metal organic precursor comprised of the formula M(NRsub1Rsub2)4 (see Abstract with a metal oxidation state of x=4) and a silicon organic precursor comprised of a silicon alkyl amide of the formula Si(NRsub1Rsub2)4 (see Abstract with x and y = 0 in the aminosilane compound) into a reaction chamber containing a substrate (see column 14, lines 47-48); (ii) purging the reaction chamber; (iii) introducing and oxidizing gas including ozone into the reaction chamber (see column 15, lines 54-57); (iv) purging the reaction chamber; (v) repeating steps (i), (ii), (iii) and (iv) until a film of a target thickness is achieved on the substrate (see column 14, lines 38-50); placing a conductive film over the dielectric film (see figure 1); wherein the temperature of the wafer is maintained between from about 250 to about 750 degrees Celsius (see column 15, lines 58-61). Baum et al. discloses the claimed invention except for process examples teaching a process temperature below 300 degrees Celsius. It would have been obvious to one having ordinary skill in the art at the time the invention was made to perform a process using a process temperature below 300 degrees Celsius, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Regarding claim 20, Baum et al. discloses the substrate being one of the two electrodes (see figure 1).

Regarding claim 21, Baum et al. discloses the metal in the metal organic precursor being a Group 4 metal (see column 15, line 62).

Regarding claim 22, Baum et al. discloses the silicon organic precursor being a silicon alkyl amide (see Abstract).

Regarding claim 23, Baum et al. discloses the metal organic precursor and the silicon organic precursor being mixed, volatilized, and introduced into the chamber as a mixed gas (see column 15, lines 62-65).

3. Claims 10, 11, 17, 18, 24 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baum et al. U.S. Patent 6,869,638 B2 filed 09/18/2001 in view of Metzner et al. U.S. Patent Application publication 2003/0232506 A1 with effective filing date of 06/14/2002.

Regarding claims 10, Baum et al. discloses introducing gas precursors into the reactor chamber but lacks disclosing volatizing and introducing the precursors into the reactor chamber concurrently. Metzner et al. discloses introducing precursors concurrently (see paragraph [0072]). It would have been obvious to a person having ordinary skills in the art at the time the invention was made to introduce the precursors

in the primary reference of Baum et al. concurrently as disclosed in Metzner et al. in order to form the metal oxide layer.

Regarding claims 11, Baum et al. discloses introducing gas precursors into the reactor chamber but lacks disclosing volatizing and introducing the precursors into the reactor chamber consecutively. Metzner et al. discloses introducing precursors concurrently (see paragraph [0072]). It would have been obvious to a person having ordinary skills in the art at the time the invention was made to introduce the precursors in the primary reference of Baum et al. consecutively as disclosed in Metzner et al. in order to form the metal oxide layer.

Regarding claims 17, Baum et al. discloses introducing gas precursors into the reactor chamber but lacks disclosing volatizing and introducing the precursors into the reactor chamber concurrently. Metzner et al. discloses introducing precursors concurrently (see paragraph [0072]). It would have been obvious to a person having ordinary skills in the art at the time the invention was made to introduce the precursors in the primary reference of Baum et al. concurrently as disclosed in Metzner et al. in order to form the metal oxide layer.

Regarding claims 18, Baum et al. discloses introducing gas precursors into the reactor chamber but lacks disclosing volatizing and introducing the precursors into the reactor chamber consecutively. Metzner et al. discloses introducing precursors

concurrently (see paragraph [0072]). It would have been obvious to a person having ordinary skills in the art at the time the invention was made to introduce the precursors in the primary reference of Baum et al. consecutively as disclosed in Metzner et al. in order to form the metal oxide layer.

Regarding claims 24, Baum et al. discloses introducing gas precursors into the reactor chamber but lacks disclosing volatizing and introducing the precursors into the reactor chamber concurrently. Metzner et al. discloses introducing precursors concurrently (see paragraph [0072]). It would have been obvious to a person having ordinary skills in the art at the time the invention was made to introduce the precursors in the primary reference of Baum et al. concurrently as disclosed in Metzner et al. in order to form the metal oxide layer.

Regarding claims 25, Baum et al. discloses introducing gas precursors into the reactor chamber but lacks disclosing volatizing and introducing the precursors into the reactor chamber consecutively. Metzner et al. discloses introducing precursors concurrently (see paragraph [0072]). It would have been obvious to a person having ordinary skills in the art at the time the invention was made to introduce the precursors in the primary reference of Baum et al. consecutively as disclosed in Metzner et al. in order to form the metal oxide layer.

Response to Arguments

4. Applicant's arguments filed 01/09/09 have been fully considered but they are not persuasive.

A. With respect to Applicant's argument that Baum does not teach introducing ozone into a reaction chamber wherein the temperature of the wafer is below 300 degrees Celsius, Baum teaches part of the process temperature range below 300 degrees Celsius (250-299 degrees Celsius) therefore as the rejection above states it would have been obvious to one having ordinary skills in the art to use the range since Baum is clearly suggesting its used by the range disclosure. Regarding Baum not teaching a temperature for the oxidizing step, Baum teaches a process temperature and since the oxidizing step is part of the process one having ordinary skills in the art would interpret and understand that the process temperature is also the oxidizing step temperature since there is no disclose distinction between the two temperatures in the teachings of Baum. With respect to Applicant's argument that Baum does not actually enable anyone to use, nor suggest using the lowest tenth of its disclosed temperature range, the disclosure of the range as part of the process temperature constitutes a suggestion to use the temperature range, with respect to the enablement argument Applicant's has not provided any scientific evidence that Baum process can not be performed at the lowest tenth of the disclosed temperature range.

B. Regarding Baum teaching away of temperatures below 400 degrees Celsius because the deposition rate would be lower In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the

features upon which applicant relies (i.e., the deposition rate) are not recited in the rejected independent claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Furthermore Baum clearly discloses temperatures below 300 degrees Celsius in the disclosed range (250-750) therefore it does not teach away it clearly suggest using the temperature range and a person of ordinary skills in the art would not interpret a temperature in a suggested temperature range as teaching away from using the temperature when its used is clearly suggested.

C. Regarding Baum teaching away from using ozone Baum clearly suggest using ozone (see rejection above) as one of the oxidizing agents therefore one having ordinary skills in the art would have been motivated to use ozone since its use is clearly suggested by Baum.

D. Regarding Baum not teaching ALD, Baum clearly discloses an ALD process in Col. 14 as admitted by Applicants and further render obvious in the rejection as stated above. Regarding Applicant's arguments that Baum does not teach "introducing ozone to the chamber wherein the temperature of the wafer is below 300 degrees Celsius" the rejection above states that it would have been obvious to one having ordinary skills in the art at the time the invention was made to perform the claimed method steps because Baum clearly suggest the temperature range below 300 degrees Celsius and ozone as an oxidizing agent and not that Baum teaches the specific method steps.

Conclusion

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANGEL ROMAN whose telephone number is (571)272-6369. The examiner can normally be reached on IFP Mo-Fr 6am-3pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Charles D Garber can be reached on (571) 272-2194. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/A. R./
Examiner, Art Unit 2812
March 27, 2009

/Alexander G. Ghyka/
Primary Examiner, Art Unit 2812